CLAIMS

I claim:

1. An external cavity tunable laser comprising:

a frequency-tuning device configured as an Acousto-optical cell including a first and a second Acousto-optical diffraction means having a narrow-band optical filtering Bragg grating; and

an etalon having spectral characteristics for cooperating with said frequency-tuning device to increase a side-mode suppression ratio of said tunable laser.

2. The external cavity tunable laser of claim 1 wherein:

said etalon having a fineness greater than or equal to 10.

3. The external cavity tunable laser of claim 1 wherein:

said etalon is spectrally aligned with a telecommunication ITU grid.

4. The external cavity tunable laser of claim 1 wherein:

said etalon is disposed immediately before said frequency tuning device along an optical path of said tunable laser.

5. The external cavity tunable laser of claim 1 wherein:

said etalon is disposed immediately after said frequency tuning device along an optical path of said tunable laser.

6. The external cavity tunable laser of claim 1 wherein:

said first Acousto-optical diffraction means comprising a first Acousto-optical crystal and said second Acousto-optical diffraction means comprising a second Acousto-optical crystal.

7. The external cavity tunable laser of claim 1 further comprising: a reflection mirror driven by a PZT assembly to reflect a beam projected from said Acousto-optical cell back to transmit therethrough again.

8. The external cavity tunable laser of claim 1 further comprising: a first electrode connected to said first Acousto-optical diffraction means and a second electrode connected to said second Acousto-optical diffraction means.

9. The external cavity tunable laser of claim 1 wherein:

said first and second Acousto-optical diffraction means having diffraction phase gratings for intra-cavity narrow-band wavelength filtering.

10. The external cavity tunable laser of claim 8 wherein:

said first electrode is connected to an RF signal for tuning a central frequency of said narrow band Bragg grating.

11. The external cavity tunable laser of claim 8 wherein:

said second electrode is connected to a second electric source to provide a second order filtering for compensating a wavelength shift.

12. The external cavity tunable laser of claim 1 further comprising:

a collimated laser source for projecting a collimated optical signal of specific wavelength through said Acousto-optical cell.

13. The external cavity tunable laser of claim 1 wherein:

said first and second Acousto-optical diffraction means are formed as a first column and a second column respectively in a single Acousto-optical crystal.

14. The external cavity tunable laser of claim 1 wherein:

said first and second Acousto-optical diffraction means are formed as a first column and a second column respectively in a Lithium Niobate ($LiNbO_3$) crystal.

15. The external cavity tunable laser of claim 1 wherein:

said first and second Acousto-optical diffraction means are formed as a first column and a second column respectively in a Tellurium Dioxide (TeO_2) crystal.

16. The external cavity tunable laser of claim 1 wherein:

said first and second Acousto-optical diffraction means are formed as a first column and a second column respectively in a birefringent crystal having a predefined responsiveness to an radio-frequency (RF) driven signal.

17. The external cavity tunable laser of claim 1 wherein:

said first and a second Acousto-optical diffraction means having said narrow-band optical filtering Bragg grating further comprising a surface acoustic wave (SAW) grating.

18. An external cavity tunable laser comprising:

a frequency-tuning device configured as an Acousto-optical cell and a reflection means for forward and backward transmitting an optical beam through said Acousto-optical cell for generating an optical beam with zero-wavelength shift and at least twice filtered by said Acousto-optical cell; and

an etalon for cooperating with said frequency-tuning device to increase a side-mode-suppression-ratio of said tunable laser.

19. The external cavity tunable laser of claim 18 wherein:

said etalon having a fineness greater than or equal to 10.

20. The external cavity tunable laser of claim 18 wherein:

said etalon is spectrally aligned with a telecommunication ITU grid.

21. The external cavity tunable laser of claim 18 wherein:

said etalon is disposed immediately before said frequency tuning device along an optical path of said tunable laser.

22. The external cavity tunable laser of claim 18 wherein:

said etalon is disposed immediately after said frequency tuning device along an optical path of said tunable laser.

24. The external cavity tunable laser of claim 18 wherein:

said Acousto-optical cell further comprising a first and a second Acousto-optical crystal.

25. The external cavity tunable laser of claim 24 wherein:

said Acousto-optical cell further comprising a first and a second Acousto-optical diffraction means disposed in an Acousto-optical crystal.

26. The external cavity tunable laser of claim 24 wherein:

said Acousto-optical cell further comprising a first and a second Acousto-optical diffraction columns respectively disposed in an Acousto-optical crystal.

27. The external cavity tunable laser of claim 24 wherein:

said first and second Acousto-optical cells are formed as a first column and a second column respectively in a birefringent crystal having a predefined responsiveness to an radio-frequency (RF) driven signal.

28. The external cavity tunable laser of claim 24 wherein:

said first and a second Acousto-optical cells having said narrow-band optical filtering Bragg grating further comprising a surface acoustic wave (SAW) grating.

29. An external cavity tunable laser comprising:

a frequency-tuning device configured as a non-collinear Acousto-optical cell having an acoustic wave propagates almost perpendicular to an optical transmission therethrough; and

an etalon cooperating with said frequency-tuning device for increasing a side-mode-suppression-ratio of said tunable laser.

30. A method for tuning a laser comprising:

tuning said laser by a frequency-tuning device configured as a non-collinear Acousto-optical cell having an acoustic wave propagates almost perpendicular to an optical transmission therethrough; and

employing an etalon of a specific fineness to cooperate with said frequency-tuning device for outputting an optical signal with an increased a side-mode-suppression-ratio (SMSR).

31. The method for tuning a laser of claim 30 further comprising:

forming said frequency-tuning device as a first and a second Acousto-optical diffraction cells and employing said etalon with a fineness equal to or greater than 10.